

EXTRUSION-FREE WET CLEANING PROCESS FOR COPPER-DUAL DAMASCENE STRUCTURES

Abstract

An extrusion-free wet cleaning process for post-etch Cu-dual damascene structures is developed. The process includes the following steps: (1).providing a wafer having a silicon substrate and at least one post-etch Cu-dual damascene structure, the post-etch Cu-dual damascene structure having a via structure exposing a portion of a Cu wiring line electrically connected with an N^+ diffusion region of the silicon substrate, and a trench structure formed on the via structure;(2).applying a diluted H_2O_2 solution on the wafer to slightly oxidize the surface of the exposed Cu wiring line;(3).washing away cupric oxide generated in the oxidation step by means of an acidic cupric oxide cleaning solution containing diluted HF, NH_4F or NH_2OH ; and (4).providing means for preventing Cu reduction reactions on the Cu wiring line.